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**PHASE 3 INTERIM MEASURE WORK PLAN  
REMOVAL AND STABILIZATION OF PCB-CONTAINING CAULK  
IN CONCRETE PAVEMENTS**

**Boeing Plant 2  
Seattle/Tukwila, Washington**

**Prepared for:**

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**April 2009**

**FILE COPY**

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**List of Abbreviations/Acronyms**

<b>Abbreviation/Acronym</b>	<b>Definition</b>
Boeing	The Boeing Company
EPA	United States Environmental Protection Agency
Golder	Golder Associates, Inc.
IM	Interim Measure
IM Work Plan	Interim Measure Work Plan: Characterization of Caulk in Concrete Pavements at Boeing Plant 2
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
ppm,	parts per million
OA	Other Area
Order	Order on Consent
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
SWMU	Solid Waste Management Unit

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### **1.0 INTRODUCTION**

This Phase 3 Interim Measure Work Plan (Phase 3 Work Plan) has been prepared on behalf of The Boeing Company (Boeing) to address the methodology and schedule for the removal or stabilization of caulk materials containing > 50 ppm PCBs or > 25 ppm and ≤ 50 ppm PCBs respectively in the concrete pavements at the Plant 2 facility in Seattle/Tukwila, Washington. The Phase 3 Work Plan was prepared in accordance with the following documents:

- Interim Measure Work Plan (IM Work Plan), Characterization of Caulk in Concrete Pavements at Boeing Plant 2, dated August 2007 (Golder 2007a) and approved by EPA in a letter dated October 1, 2007
- Phase 1 Report and Work Plan, Characterization of Caulk in Concrete Pavements at Boeing Plant 2, dated May 2008 (Golder 2008a) and approved by EPA in a letter dated June 16, 2008
- Draft Phase 2 Report and Work Plan, Characterization of Caulk in Concrete Pavements at Boeing Plant, dated October 2008 (Golder 2008e) and approved by EPA in a letter dated February 13, 2009

The above work plans and reports were prepared, and the work was performed, in accordance with Administrative Order on Consent (Order) No. 1092-01-22-3008(h) between Boeing and the Environmental Protection Agency (EPA) Region X. The Order is issued pursuant to Section 3008(h) of the Solid Waste Disposal Act, also referred to as the Resource Conservation and Recovery Act (RCRA). The IM Work Plan was submitted pursuant to EPA's February 15, 2007 and April 11, 2007 letters, the latter being sent following Boeing's February 26, 2007 letter, and discussions on this subject. In short, the EPA letters required Boeing to submit an interim measure work plan to identify all polychlorinated biphenyl (PCB) contaminated caulk at the facility with concentrations of PCBs above 1 part per million (ppm). The April 2007 letter specified inclusion of a discussion on the future removal of all caulk with PCB concentrations in excess of 50 ppm and a contingency for the stabilization or removal of all caulk with PCB concentrations between 25 and 50 ppm.

In accordance with the IM Work Plan, this Phase 3 Work Plan presents summaries of the work performed and reports submitted previously under the IM Work Plan, summarizes work performed under related work plans, and describes the methods and schedule for the removal or stabilization of identified caulk materials containing the PCB concentration ranges prescribed by EPA.

### **1.1 Background**

Plant 2 is located on 107 acres between the Duwamish Waterway and East Marginal Way South in Seattle and Tukwila, Washington (Figure 1). With the exception of small landscaped areas, the ground surface at Plant 2 is topographically flat and either paved or covered by buildings. Stormwater falling upon pavement or buildings is discharged to the Duwamish Waterway under a National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Industrial Activities, in compliance with the State of Washington Water Pollution Control Law (Chapter 90.48 RCW) and the Federal Water Pollution Control Act (The Clean Water Act) (Title 33 United States Code, Section 1251 et seq.).

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#### **1.2 Description of Plant 2 Pavements and Slabs**

Plant 2 was divided into five geographical areas for the purpose of this IM Work Plan (Figure 2). The five geographical areas include the North Area, the 2-10/31 Area (2-10 Area), the 2-40s Area, the 2-60s/2-66 Area (2-60s Area), and the South Yard. Figure 2 includes estimates of the pavement areas and joint lengths for each of these areas. The surfacing in the North Area comprises an area of approximately 13 acres, and consists primarily of recent asphalt with little or no caulk material. The surfacing in the 2-10, 2-40s, and 2-60s Areas comprises an area of approximately 29 acres, and consists primarily of older, jointed and/or cracked concrete with caulk material in the joints and/or cracks. The surfacing in the South Yard comprises an area of approximately ten acres, and consists primarily of recent asphalt with little or no caulk material. Within these areas a few locations warrant special mention. A small space near the SCL Transformer pad (OA-11) is concrete containing little caulk that will be excavated and replaced with asphalt when that space is remediated; and the area was therefore not included in this work plan. Some small paved spaces east of the 20-series buildings are comprised of concrete and joint materials constructed in the 1990s; given their recent construction these small spaces were not included in this work plan. Similarly, on the east margin of the 2-10 Area recent refurbishment of the jet fuel tank space included removal and replacement of its original caulk; as such, that small space was also not included in this characterization work (See Figure 2).

As is described further below, the concrete pavements in the 2-10 and 2-40s Areas and the concrete pavements and slabs in the 2-60s Area were the focus of this IM Work Plan due to the presence, age and nature of the caulk materials in concrete in those areas.

#### **1.3 Recent Actions**

##### **1.3.1 Caulk Investigations**

##### **2005/2006 2-60s Area Investigation**

Between October 2005 and April 2006, following identification of PCBs in catch basin solids samples collected in stormlines X and Y, Boeing investigated caulking materials that had been applied to joints in paved roadways and concrete slabs in the drainage area served by Lines X and Y (2-60s Area). The investigation was conducted to provide an indication of whether joint caulk materials may have been a possible source of PCBs. Inspection of these areas revealed multiple applications of a variety of caulk materials used to seal cracks and seams in the roadways and building slabs. Sample locations were selected based on their variability of joint materials and the relative amount of joint material present. Forty-six caulk samples, representative of the numerous types of caulk material (based on appearance) in the area, were collected during that investigation. The visually identifiable physical characteristics of the joint materials were recorded for each sample location, and the samples were sent to an analytical laboratory for testing. Results for PCBs ranged from non-detect (at a reporting limit [RL] of 0.79 ppm) to 40,500 ppm. A summary of the results of the 2005/2006 investigation was presented as Table 1 in Attachment A of the IM Work Plan (Golder 2007a). The PCB concentrations in caulk used in the 2-60s Area concrete pavement areas were consistently and significantly lower than concentrations in the caulk used in the 2-60 Area building concrete slabs that were left in place temporarily following demolition of their overlying building structures. Additional evaluation of the 2005/2006 data were performed for characterization purposes in

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support of the Phase 1 investigation in 2007 (see Phase 1 Report and Work Plan, Characterization of Caulk in Concrete Pavements at Plant 2 [Phase 1 Report], dated May 2008 (Golder 2008a)).

#### **Phase 1 Investigation**

During 2007, a systematic approach was implemented to develop a baseline characterization of the caulk types in the concrete slabs and pavements in the 2-10, 2-40s, and 2-60s Areas:

- The 2005/2006 caulk data from the 2-60s Area were first reviewed and evaluated to describe and determine caulk physical appearances that could be used to identify those same caulks that may be present elsewhere in the study area. Samples were collected during 2007 at the same locations as most of the 2005/2006 samples to enable closer visual examination of the caulks and standardization of caulk descriptions. Additionally, several duplicate samples were submitted for laboratory analyses in cases where the 2005/2006 analytical data indicated PCB reporting limits (RLs) above 1 ppm that would compromise the use of those earlier results.
- Caulk sampling and analytical testing were conducted on sixty seven caulk samples from the 2-10 and 2-40s Areas, and four caulk samples from the 2-60s Area. Data from the 2005/2006 and 2007 studies were then reviewed and evaluated with the objective of establishing the visual properties for each distinct caulk type that could in turn be used to systematically identify all caulks and their respective concentrations of PCBs.
- Caulk types were initially evaluated and characterized on the basis of visual properties first separately by area, and then collectively for all three areas.

Careful review of existing data and close examination of caulk material samples resulted in the identification of fifteen types of caulk materials in the pavements of the 2-10, 2-40s, and 2-60s Areas based upon visually identifiable physical properties (appearance and texture). Several of the caulk types were observed in all three areas, but most caulk types were not observed in all three areas. The details and results of the Phase 1 investigation were presented in the EPA-approved Phase 1 Report (Golder 2008a).

#### **Phase 2 Investigation**

Detailed mapping of the caulk materials in the concrete joints was performed during 2008 in the 2-10, 2-40s, and 2-60s Areas based upon the visual properties established by the Phase 1 baseline characterization. The mapping was required to identify the specific locations of caulk materials containing > 1ppm PCBs; to enable an evaluation of recent catch basin and stormwater sampling results versus the areas containing caulk with elevated concentrations of PCBs such that stormwater source control issues could be better understood; and to enable recommendations regarding caulk removal (> 50 ppm PCBs) or stabilization (> 25 ppm and ≤ 50 ppm PCBs) actions. Two additional variations of a previously identified caulk material were discovered during the mapping process; those additional types were mapped, sampled, tested for PCBs, and characterized per the baseline characterization process.

A total of 107 additional caulk samples were collected in the 2-10, 2-40s, and 2-60s Areas during the Phase 2 investigation, and resulted in the identification of a total of 17 types of caulk materials in the pavements of the 2-10, 2-40s, and 2-60s Areas based upon visually identifiable

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physical properties (appearance and texture). Additionally, subsets of three of the seventeen caulk types were developed based upon ranges of PCB concentrations. All details and results of the Phase 2 investigation were presented in the EPA-approved Draft Phase 2 Report and Work Plan (Golder 2008e).

#### **1.3.2 Past Construction and Removal Activities**

In March 2006, installation of a temporary stormwater collection and treatment system was completed to replace the drainage capacity of stormlines X and Y. This construction activity included the temporary sealing at the surface of all the catch basins and manholes on the X and Y lines to remove those lines from service, and the installation of new drains, lines, asphalt swales and a modern treatment vault which collects solids and stormwater and conveys stormwater into stormline Z. Line Z is immediately south of the X and Y lines. In October 2006 following a video survey, the catch basins and manholes on the X and Y lines in the area of the 2-66 slab were backfilled with controlled density fill (CDF) and the accessible outfalls for those lines were sealed at the waterway. In May 2007, Boeing completed the removal of the X and Y lines from the 2-60s Area (east of the 2-66 slab), as documented in the EPA-approved Interim Measure Completion Report, Removal of Stormwater Lines X & Y (OA 23.1 and OA 23.2) in 2-60s Area at Boeing Plant 2, dated May 2008 (Golder 2008b). Additionally, Building 2-64 was demolished in May 2007 and its foundations and immediately-adjacent pavements were removed and replaced with asphalt surfacing.

As a result of the removal of those portions of the X and Y stormlines and the demolition of Building 2-64, caulks at the locations of five of the caulk samples collected in the 2-60s Area during 2005/2006 were removed. These five caulk samples had PCB concentrations ranging from non-detect (at an RL of 0.8 ppm) to 740 ppm. Additionally, all caulk represented by three samples containing PCB concentrations ranging from 29,300 ppm to 40,500 ppm were removed by Boeing from a single equipment foundation on the Building 2-65 slab (see Figure 5).

#### **1.3.3 Stormwater Sampling**

Given the possible association between the caulk at Plant 2 as a potential source of PCBs and the PCB concentrations detected in the stormwater system solids, it is appropriate to consider information regarding stormwater source control sampling. Accordingly, and to further investigate concentrations of PCBs and metals detected in catch basin solids during the 2005 survey of the Plant 2 stormwater system, Boeing and EPA initiated an annual stormwater source control sampling program to evaluate the potential for active stormwater lines at Plant 2 to convey hazardous substances to the Duwamish Waterway via stormwater discharges. To address EPA's requirements for this work identified in a May 26, 2006 letter, the Stormwater Source Control Work Plan for Boeing Plant 2 (Golder, 2006) was drafted and then approved in October, 2006. That work plan established a source control sampling program consisting of one-time or annual sampling and analysis of suspended solids and/or water along 12 of the 24 active stormwater lines at Plant 2 during the rainy season (approximately October to March). Source control sampling results are compared to action levels established in the work plan, and action level exceedences trigger further actions such as additional monitoring, source identification and/or source control or elimination work.

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The first round ("round 1") of source control sampling was conducted between October 2006 and April 2007, and the round 1 sampling report (Golder, 2007b) was approved by EPA in October 2007. Round 2 sampling was conducted between October 2007 and May 2008 in accordance with the Revised Stormwater Source Control Work Plan for Boeing Plant 2 (Golder, 2007c). The round 2 sampling report was submitted to EPA in May 2008, conditionally approved with comments by EPA in August, 2008, and resubmitted for final approval in September, 2008 (Golder 2008d). Round 3 sampling is currently being conducted. Annual source control sampling will continue until baseline conditions have been established, and appropriate source control actions have been identified, completed, and verified.

#### **1.3.4 Stormwater System Sampling and Cleaning**

Boeing submitted to EPA the 2008 Stormwater Source Control Interim Measure Work Plan for Boeing Plant 2 (Golder 2008c) in May 2008. The work plan was approved by EPA in a letter received by Boeing on July 2, 2008. In accordance with the work plan, Boeing implemented an interim measure on five storm lines (A, B, I, J, and Z) in the Plant 2 stormwater system during the summer and fall of 2008 to address action level exceedences identified during the first two rounds of stormwater source control sampling. The 2008 IM consisted of:

- Visually inspecting all accessible catch basins and collecting 494 solids samples from 364 locations to assess potential entry points for PCBs and metals
- Cleaning 417 catch basins and structures based on the analytical results and the visual inspections
- Cleaning more than 5 miles of storm lines and removing approximately 117 cubic yards of legacy solids that may have been ongoing sources of PCBs and metals detected during source control sampling
- Conducting a video survey in more than 3 miles of storm lines to assess the integrity of the pipes and evaluate the cleaning effectiveness
- Installing 287 geotextile filter fabric inserts at all accessible catch basins and inlets to reduce the volume of solids entering the storm system

The IM removed legacy residual solids material from the storm system that may have been a source of PCBs and metals detected during the first two rounds of stormwater source control sampling, and implemented controls to reduce future solids accumulation in the system. All details and results of the IM were presented in the Draft Interim Measure Completion Report, 2008 Stormwater Source Control Catch Basin Sampling and Stormline Cleaning for Boeing Plant 2 (Golder 2008f), dated December 2008.

## **2.0 OBJECTIVE OF INTERIM MEASURE**

The objective of this IM was to determine and map the concrete joint locations of caulk materials containing PCB concentrations above 1 ppm, identify the caulk materials requiring removal (> 50 ppm PCBs) or stabilization (> 25 ppm and ≤ 50 ppm PCBs), and describe the methods proposed for the removal or stabilization of the subject materials. The removal or stabilization of the identified materials containing > 25 ppm PCBs will be performed as a function of source control to preclude the migration of the materials to the Duwamish Waterway.

This objective was to be accomplished in phases.

- Phase 1 provided a baseline characterization of caulk materials and included correlation of caulk physical properties (i.e., appearance and texture) to PCB concentrations in the caulk. The characterization was presented in the Phase 1 Report (Golder 2008a), which established the visual properties and sampling approach to be used during the Phase 2 investigation to categorize and map all caulks relative to their ranges of PCB concentrations.
- Phase 2 included: 1) sampling and testing of newly-observed caulk types that were not previously identified, 2) additional sampling and testing of two previously identified caulk types that exhibited wide ranges of PCB concentrations, 3) detailed mapping of all of the caulks characterized during Phase 1 and Phase 2 of this IM Work Plan, and 4) proposing actions for caulk materials containing PCB concentrations > 25 ppm.
- Phase 3 includes: 1) methodology for the removal or stabilization of caulk materials containing > 50 ppm PCBs or > 25 ppm and ≤ 50 ppm PCBs respectively, and 2) a schedule for the removal or stabilization of the subject caulk materials.

### 3.0 CAULK CHARACTERIZATION, SAMPLING AND MAPPING

#### 3.1 Phase 1 and Phase 2 Summary

The Phase 1 and Phase 2 caulk investigations of the concrete pavements and slabs in the 2-10, 2-40s, and 2-60s Areas at Plant 2 resulted in the visual identification of 17 types of caulk materials based on physical characteristics such as color, texture and consistency. Detailed mapping of the 17 caulk types was performed, and the mapping is presented on Figures 3, 4, and 5.

A total of 224 samples of caulk materials were collected and analyzed for PCBs during the 2005/2006, Phase 1, and Phase 2 investigations, and PCB concentration ranges were designated for each of the 17 caulk types identified. Three of the caulks, Types 1A, 1C, and 4A, were divided into subsets based on varying ranges of PCBs detected in those materials. Including the subset caulks, 21 caulk categories were identified based upon PCB concentration ranges and physical characteristics. The caulk types and their PCB concentration ranges are discussed below.

**Type 1A:** Ninety samples collected in the 2-10, 2-40s, and 2-60s Areas contained PCB concentrations ranging from non-detect (at an RL of 0.73 ppm) to 39,000 ppm. Type 1A caulk was divided into three subsets based upon ranges of PCB concentrations:

- **Type 1A1 Subset (> 1 ppm and ≤ 25 ppm PCBs):** Seventy-six samples, including 41 collected in the 2-10 Area, 10 collected in the 2-40s Area, and 25 collected in the 2-60s Area contained PCB concentrations ranging from non-detect (at an RL of 0.73 ppm) to 24.8 ppm.
- **Type 1A2 Subset (> 50 ppm PCBs):** Eight samples, including 5 collected on the 2-62 slab, one collected near the southwest corner of Building 2-64, one collected on the 2-65 slab, and 2 collected on the east side of Building 2-15 contained PCB concentrations ranging from 54 to 39,000 ppm.
- **Type 1A3 Subset (> 25 ppm and ≤ 50 ppm PCBs):** Six samples, including 4 collected in the 2-10 Area and 2 collected in the 2-60s Area contained PCB concentrations ranging from 25.8 to 48 ppm.

**Type 1B (> 1 ppm and ≤ 25 ppm PCBs):** Eighteen samples, including 8 collected in the 2-10 Area, six collected in the 2-40s Area, and 4 collected in the 2-60s Area contained PCB concentrations ranging from non-detect (at an RL of 0.79 ppm) to 8.1 ppm.

**Type 1C:** Twenty-nine samples collected in the 2-10, 2-40s and 2-60s Areas contained PCB concentrations ranging from 2.2 to 44 ppm. Type 1C caulk was divided into two subsets based upon ranges of PCB concentrations:

- **Type 1C1 Subset (> 1 ppm and ≤ 25 ppm PCBs):** Twenty-three samples, including 11 collected in the 2-10 Area, five collected in the 2-40s Area, and 7 collected in the 2-60s Area had PCB concentrations ranging from 2.2 to 24 ppm.

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- **Type 1C2 Subset (> 25 ppm and ≤ 50 ppm PCBs):** Six samples, including 4 collected in the 2-10 Area and 2 collected in the 2-60s Area had PCB concentrations ranging from 29 to 40 ppm.

**Type 1D (> 1 ppm and ≤ 25 ppm PCBs):** One sample collected in the 2-40s Area contained a PCB concentration of 8.3 ppm.

**Type 1E (> 1 ppm and ≤ 25 ppm PCBs):** Twenty-two samples, including 4 collected in the 2-10 Area, fifteen collected in the 2-40s Area, and 3 collected in the 2-60s Area contained PCB concentrations ranging from non-detect (at an RL of 0.79 ppm) to 3.0 ppm.

**Type 2A (> 1 ppm and ≤ 25 ppm PCBs):** Nine samples were collected, including 3 in the 2-10 Area, three in the 2-40s Area, and 3 in the 2-60s Areas, and no PCBs were detected in any of the samples. However, due to chromatographic interference during the analyses of some of the samples, the RLs for the non-detected PCB concentrations ranged from 0.79 to 2.0 ppm. With RLs exceeding 1 ppm, the caulk was conservatively categorized as containing >1 ppm and ≤25 ppm PCBs.

**Type 2B (< 1 ppm PCBs):** One sample was collected in the 2-10 Area, and PCBs were not detected in the sample at an RL of 0.8 ppm.

**Type 2C (< 1 ppm PCBs):** Three samples were collected, including one in the 2-40s Area and two in the 2-60s Area. PCBs were not detected (at an RL of 0.79 ppm) in the sample from the 2-40s Area. The 2 samples from the 2-60s Area were collected from an equipment foundation on the 2-65 slab in 2005/2006, were characterized as Type 2C caulk based upon their 2005/2006 descriptions, and had PCB concentrations of 29,300 ppm and 40,500 ppm. Boeing removed all of the Type 2C caulk material from the equipment foundation on the 2-65 slab. The high concentrations of PCBs in the two 2005/2006 Type 2C caulk samples from the 2-65 slab may have been related to historical uses of the equipment foundation from which the samples were collected. Other than the 2007 sample located in the 2-40s Area, no other Type 2C caulk samples were collected and very little of the caulk type was observed elsewhere onsite during these investigations. The Type 2C caulk was therefore categorized as containing < 1 ppm PCBs as indicated in the Phase 1 Report (Golder 2008a).

**Type 3 (> 1 ppm and ≤ 25 ppm PCBs):** Four samples, including 2 in the 2-10 Area and 2 in the 2-60s Area, were collected and contained PCB concentrations ranging from non-detect (at an RL of 0.79 ppm) to 2.2 ppm.

**Type 4A:** Eleven samples collected in the 2-60s Area contained PCB concentrations ranging from 2.3 to 34,000 ppm. Seven of the samples had PCB concentrations ranging from 2.3 to 22.5 ppm, three of the samples had PCB concentrations ranging from 27 to 29 ppm, and one sample had an anomalous PCB concentration of 34,000 ppm. The Type 4A caulk was divided into two subsets during the Phase 2 investigation based on ranges of PCB concentrations.

- **Type 4A1 Subset (> 1 ppm and ≤ 25 ppm PCBs):** Seven samples collected in the 2-60s Area had PCB concentrations ranging from 2.3 to 22.5 ppm.
- **Type 4A2 Subset (> 25 ppm and ≤ 50 ppm PCBs):** Four samples collected in the 2-60s Area had PCB concentrations ranging from 27 to 34,000 ppm. Three of the samples had PCB concentrations between 27 and 29 ppm, and one sample had a PCB

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concentration of 34,000 ppm. All of the caulk represented by the sample containing 34,000 ppm PCBs was located on and removed by Boeing from the equipment footing on the 2-65 slab where Type 2C caulk containing anomalous PCB concentrations was also removed. The high concentrations of PCBs in the Type 4A and Type 2C caulk samples collected at the equipment foundation on the 2-65 slab may have been related to historical uses of the equipment foundation from which the samples were collected. As a result of the removal of the caulk containing the 34,000 ppm PCBs, the Type 4A2 caulk was categorized as containing > 25 ppm and ≤ 50 ppm PCBs as indicated previously for the Type 4 caulk in the Phase 1 Report (Golder 2008a).

**Type 4B (> 1 ppm and ≤ 25 ppm PCBs):** Twelve samples, including 6 in the 2-10 Area and 6 in the 2-60s Area, were collected and contained PCB concentrations ranging from non-detect (at an RL of 0.67 ppm) to 22.8 ppm.

**Type 4C (> 1 ppm and ≤ 25 ppm PCBs):** Nine samples, including one in the 2-10 Area, one in the 2-40s Area, and 7 in the 2-60s Area, were collected and contained PCB concentrations ranging from non-detect (at an RL of 0.71 ppm) to 15.6 ppm.

**Type 5 (> 1 ppm and ≤ 25 ppm PCBs):** Five samples, three of which were duplicates of the first two samples, were collected in the 2-60s Area. PCBs were not detected in any of the samples as detailed in Section 3.1.2 of the Phase 1 Report. Chromatographic interference during the analyses of the first two samples and a duplicate sample resulted in elevated RLs ranging from 16 ppm to 80 ppm. Re-analyses of duplicates of the first two samples also resulted in chromatographic interference, but the RLs were lowered to 9.6 ppm and 9.9 ppm, thereby superseding the original results. Although PCBs were not detected in any of the samples, RLs exceeding 1 ppm warranted categorizing the Type 5 caulk as containing >1 ppm and ≤25 ppm PCBs.

**Type 6 (> 1 ppm and ≤ 25 ppm PCBs):** Three samples collected in the 2-60s Area contained PCB concentrations ranging from 6.2 to 10.0 ppm.

**Type 7 (> 1 ppm and ≤ 25 ppm PCBs):** Two samples collected in the 2-10 Area contained PCB concentrations of non-detect (at an RL of 0.79 ppm) and 3.2 ppm.

**Type 8A (> 1 ppm and ≤ 25 ppm PCBs):** Three samples, two of which were duplicates of the first sample, were collected in the 2-60s Area. PCBs were not detected in any of the samples as detailed in Section 3.1.2 of the Phase 1 Report. Chromatographic interference during the analyses of the first sample and its duplicate resulted in elevated RLs ranging from 400 ppm to 560 ppm. Re-analyses of a second duplicate sample also resulted in chromatographic interference, but the RL was lowered to 7.8 ppm, thereby superseding the original results. Although PCBs were not detected in any of the samples, the RL exceeding 1 ppm warranted categorizing the Type 8A caulk as containing > 1 ppm and ≤ 25 ppm PCBs.

**Type 8B (> 1 ppm and ≤ 25 ppm PCBs):** Two samples were collected in the 2-60s Area and contained PCB concentrations of 1.6 ppm and 2.7 ppm.

The analytical data for all samples were detailed in Tables 1 and 2 of the Phase 2 Report and Work Plan (Golder 2008e), and a tabular summary of the information is presented below.

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**Summary of Phase 2 Caulk Investigation Results**

Caulk Type	Subset Caulk Types*	PCB Concentration Range	Number of Samples	Estimated Linear Feet	Color	Description
1A	1A1	>1 ppm & ≤25 ppm	76	21,924	Dull black	Stiff to hard. Fresh surface black, glassy, rough, crumbly
	1A2	> 50 ppm	8	1,220		
	1A3	>25 ppm & ≤50 ppm	6	797		
1B		>1 ppm & ≤25 ppm	18	22,722	Dull black	Stiff to hard, brittle. Fresh surface black, glassy, conchoidal fracture.
1C	1C1	>1 ppm & ≤25 ppm	23	2,667	Dull black	Same as Type 1A, but includes metal shavings, small screws, etc. in caulk matrix.
	1C2	>25 ppm & ≤50 ppm	6	723		
1D		>1 ppm & ≤25 ppm	1	5,532	Dull black	Same as Type 1A, but pliable to semi-pliable.
1E		>1 ppm & ≤25 ppm	22	26,828	Dull black	Soft to stiff, pliable to semi-pliable. Fresh cut surface dull to semi-glossy black, smooth to rough.
2A		>1 ppm & ≤25 ppm	9	4,324	Light gray	Soft to stiff, pliable, spongy to rubbery.
2B		< 1 ppm	1	103	Light gray	Strong, very stiff to very hard, brittle.
2C		< 1 ppm	3	614	Dull gray	Stiff to hard, pliable.
3		>1 ppm & ≤25 ppm	4	4,788	Brown to black	Soft to firm, pliable & spongy.
4A	4A1	>1 ppm & ≤25 ppm	7	802	Dull gray to brown-Black	Soft, fibrous, friable. Wood-like appearance.
	4A2	>25 ppm & ≤50 ppm	4	1,445		
4B		>1 ppm & ≤25 ppm	12	2,477	Dull brown to brown-black	Soft to stiff, fibrous, friable. Fine-med tan fibers, peat moss-like appearance.
4C		>1 ppm & ≤25 ppm	9	2,934	Dull brown to brown-black	Stiff to semi-hard, friable, platy, brittle. Fine light tan fibers, slate-like appearance
5		>1 ppm & ≤25 ppm	5	525	Brown	Soft, pliable, spongy, stretchy, sticky.
6		>1 ppm & ≤25 ppm	3	132	Red-brown to black	Stiff, semi-pliable. Fresh surface smooth, yellow/brown/orange.
7		>1 ppm & ≤25 ppm	2	343	Amber	Smooth, translucent, very hard, glassy.
8A		>1 ppm & ≤25 ppm	3	306	White	Soft to stiff, pliable, spongy.
8B		>1 ppm & ≤25 ppm	2	172	White	Firm to stiff, finely wrinkled, cracked. Fresh surface smooth, dull grayish-white.
No Caulk in Joints				22,622		
<b>Totals</b>			<b>224</b>	<b>124,000</b>		

\* Subset caulk types based on range of PCB concentrations.

Note: Shading indicates caulk type designated for removal or stabilization

Note: Extent of caulk material exposure to sun or vehicular traffic was not a determinative factor in the characterization process.

### **3.2 Actions Proposed in Phase 2 Report**

The caulk characterization and mapping resulted in the identification of four caulk types, including subsets, in the 2-10 Area and the 2-60s Area that require further action based on a PCB concentration action level of 25 ppm. No caulks containing > 25 ppm PCBs were found in the 2-40s Area and, accordingly, no actions are considered in that area.

In accordance with EPA's letter to Boeing on April 11, 2007, the actions required for caulk containing > 25 ppm PCBs include removal of caulks containing PCB concentrations > 50 ppm, and stabilization of caulks containing PCB concentrations > 25 ppm and ≤ 50 ppm. The caulk types and/or subsets designated as containing PCB concentrations above the 25 ppm action level are shaded in the above table and listed below:

- Type 1A2: > 50 ppm (Removal of 1220 linear feet)
- Type 1A3: > 25 ppm & ≤ 50 ppm (Stabilization of 797 linear feet)
- Type 1C2: > 25 ppm & ≤ 50 ppm (Stabilization of 723 linear feet)
- Type 4A2: > 25 ppm & ≤ 50 ppm (Stabilization of 1445 linear feet)

Most of the caulk materials requiring removal or stabilization were weathered and deteriorated, and the distinction between the degrees of weathering and deterioration were generally not significant enough to be used as meaningful criteria for prioritizing the removal or stabilization actions. As such, prioritization of the caulk removal or stabilization will be based on the PCB concentrations in the materials, source control factors, or efficiency factors in performing the work.

Caulk removal or stabilization actions, as presented in the Phase 2 Report, are described in the following sections of this report and shown on Figures 6 and 7.

#### **3.2.1 Removal**

Boeing will remove caulk materials containing > 50 ppm PCBs.

#### **2-10 Area**

**East of Building 2-15 (Type 1A):** Eighteen samples of Type 1A caulk were collected in the 2-10 Area east of Building 2-15. Based on PCB concentrations, twelve of the samples were designated as subset Type 1A1 (> 1 ppm and ≤ 25 ppm PCBs), four of the samples were designated as subset Type 1A3 (> 25 ppm and ≤ 50 ppm PCBs), and two of the samples were designated as subset Type 1A2 (> 50 ppm PCBs). The area containing the Type 1A2 caulk was bounded on the north by locations of adjacent samples of Type 1A caulk (subsets 1A1 and 1A3) that contained < 50 ppm PCBs. Boeing will remove the 240 linear feet of subset Type 1A2 in the subject area, as shown on Figure 6.

## **2-60s Area**

**2-62 Slab (Type 1A):** Eleven samples of Type 1A caulk were collected on the 2-62 slab. Based on PCB concentrations, 6 of the samples were designated as subset Type 1A1 (> 1 ppm and ≤ 25 ppm), 4 of the samples were designated as subset Type 1A2 (> 50 ppm), and one of the samples was designated as subset Type 1A3 (> 25 ppm and ≤ 50 ppm). The locations of the subset Type 1A2 samples indicated that two areas on the slab contained caulk with > 50 ppm PCBs. One area contained 440 linear feet of subset Type 1A2 caulk and the other area contained 490 linear feet of subset Type 1A2 caulk. The areas containing the Type 1A2 caulk were bounded by locations of adjacent samples of Type 1A caulk (subsets 1A1 and 1A3) that contained < 50 ppm PCBs. Boeing will remove the 930 linear feet of subset Type 1A2 caulk in the subject areas, as shown on Figure 7.

**2-65 Slab (Type 1A):** Three samples of Type 1A caulk were collected on the 2-65 slab. Based on PCB concentrations, one sample was designated as subset Type 1A1 (> 1 ppm and ≤ 25 ppm), one sample was designated as subset Type 1A2 (> 50 ppm), and one sample was designated as subset Type 1A3 (> 25 ppm and ≤ 50 ppm). The extents of the area containing the subset Type 1A2 caulk were limited. Boeing will remove the 50 linear feet of subset Type 1A2 caulk in the subject area, as shown on Figure 7.

### **3.2.2 Stabilization**

Boeing will stabilize caulk materials containing > 25 ppm and ≤ 50 ppm PCBs.

## **2-10 Area**

**East of Building 2-15 (Type 1A):** Eighteen samples of Type 1A caulk were collected in an area on the east side of Building 2-15. Based on PCB concentrations, 12 of the 18 samples were designated as subset Type 1A1 (> 1 ppm and ≤ 25 ppm), 4 of the samples were designated as subset Type 1A3 (> 25 ppm and ≤ 50 ppm), and 2 of the samples were designated as subset Type 1A2 (> 50ppm). The removal of the subset Type 1A2 caulk was addressed in Section 3.2.1. The area containing the Type 1A3 caulk was bounded on the south by the removal area for subset Type 1A2 caulk, and on north and east by samples of subset Type 1A1 caulk that contained less than 25 ppm PCBs. Boeing will stabilize the approximately 632 linear feet of subset Type 1A3 caulk in the subject area, as shown on Figure 6.

**South of Building 2-10 (Type 1C):** Six samples of Type 1C caulk were collected in an area on the south side of Building 2-10. Based on PCB concentrations, 5 of the 6 samples were designated as subset Type 1C1 (> 1 ppm and ≤ 25 ppm PCBs), and one of the samples was designated as subset Type 1C2 (> 25 ppm and ≤ 50 ppm PCBs). The area containing the Type 1C2 caulk was bounded by locations of adjacent samples of subset Type 1C1 caulk. Boeing will stabilize the 348 linear feet of subset Type 1C2 caulk in the subject area, as shown on Figure 6.

## **Draft Phase 3 IM Work Plan**

### **Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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**Under 16<sup>th</sup> Ave South Bridge (Type 1C):** Eight samples of Type 1C caulk were collected in an area generally located under the 16<sup>th</sup> Avenue South Bridge. Based on PCB concentrations, 5 of the 8 samples were designated as subset Type 1C1 (> 1 ppm and ≤ 25 ppm PCBs), and 3 of the samples were designated as subset Type 1C2 (> 25 ppm and ≤ 50 ppm PCBs). The area containing the Type 1C2 caulk was bounded by locations of adjacent samples of subset Type 1C1 caulk. Boeing will stabilize the 317 linear feet of subset Type 1C2 caulk in the subject area, as shown on Figure 6.

#### **2-60s Area**

**2-62 Slab (Type 1A):** Eleven samples of Type 1A caulk were collected on the 2-62 slab. Based on PCB concentrations, 6 of the samples were designated as subset Type 1A1 (> 1 ppm and ≤ 25 ppm), 4 of the samples were designated as subset Type 1A2 (> 50 ppm), and one of the samples was designated as subset Type 1A3 (> 25 ppm and ≤ 50 ppm). The removal of the Type 1A2 caulk was addressed in Section 3.2.1. The area containing the subset Type 1A3 caulk was bounded by locations of adjacent samples of subset Types 1A1 and 1A2 caulk. Boeing will stabilize the 110 linear feet of subset Type 1A3 caulk in the subject area, as shown on Figure 7.

**2-62 Slab (Type 4A):** No samples of Type 4A caulk were collected on the 2-62 slab, and the small quantity of Type 4A caulk found in two areas on that slab was conservatively designated as subset Type 4A2 (> 25 ppm and ≤ 50 ppm). Boeing will stabilize the 30 linear feet of subset Type 4A2 caulk found in two areas on that slab, as shown on Figure 7.

**2-63 Slab (Type 4A):** No samples of Type 4A caulk were collected on the 2-63 slab, and the Type 4A caulk found on that slab was conservatively designated as subset Type 4A2 (> 25 ppm and ≤ 50 ppm). Boeing will stabilize the 250 linear feet of subset Type 4A2 caulk located on both sides of a footing on that slab, as shown on Figure 7.

**2-65 Slab (Types 1A, 1C, & 4A):** Eleven samples of Types 1A, 1C and 4A caulk were collected on the 2-65 slab, including 3 samples of Type 1A, one sample of Type 1C, and 7 samples of Type 4A. The Type 1A samples, based on PCB concentrations, included one sample of subset Type 1A1 (> 1 ppm and ≤ 25 ppm), one sample of subset Type 1A2 (> 50 ppm), and one sample of subset Type 1A3 (> 25 ppm and ≤ 50 ppm). The Type 1C sample, based on its PCB concentration, was designated as subset Type 1C2 (> 25 ppm and ≤ 50 ppm). The Type 4A samples, based on PCB concentrations, included 4 samples of subset Type 4A1 (> 1 ppm and ≤ 25 ppm) and 3 samples of subset Type 4A2 (> 25 ppm and ≤ 50 ppm). The subset Type 1A2 caulk was addressed in Section 3.2.1. The area on the 2-65 slab containing caulk with PCB concentrations > 25 ppm and ≤ 50 ppm (subset Types 1A3, 1C2, and 4A2) was bounded by locations of adjacent samples of caulks that contained less than 25 ppm PCBs. The lengths of joints containing the caulks in the subject area included 55 linear feet of subset Type 1A3, 45 linear feet of subset Type 1C2, and 250 linear feet of subset Type 4A2. Boeing will stabilize the 350 linear feet of subset caulk Types 1A3, 1C2, and 4A2 in the subject area, as shown on Figure 7.

**Draft Phase 3 IM Work Plan**  
**Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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**2-66 Slab (Types 1C & 4A):** Three samples of Type 1C caulk and 2 samples of Type 4A caulk were collected on the 2-66 slab. Based on PCB concentrations, 2 of the Type 1C samples were designated as subset Type 1C1 ( $> 1$  ppm and  $\leq 25$  ppm) and the other Type 1C sample was designated as subset Type 1C2 ( $> 25$  ppm and  $\leq 50$  ppm). One of the Type 4A samples was designated as subset Type 4A1 ( $> 1$  ppm and  $\leq 25$  ppm), and one of the Type 4A samples was designated as subset Type 4A2 ( $> 25$  ppm and  $\leq 50$  ppm). As such, two areas were identified on the 2-66 slab as containing caulk with PCB concentrations  $> 25$  ppm and  $\leq 50$  ppm. The area containing the subset Type 1C2 caulk is located on the west edge of the slab. Most of the Type 4A caulk on the 2-66 Slab was conservatively designated as subset Type 4A2, and the area containing that caulk therefore includes most of the major joints in the slab. Boeing will stabilize the 13 linear feet of subset Type 1C2 caulk and the 915 linear feet of subset Type 4A2 caulk in the subject areas of the 2-66 slab as shown on Figure 7.

### **3.2.3 Phase 2 Report and Work Plan Approval**

EPA approved the Phase 2 Report and Work Plan in a letter received by Boeing on February 19, 2009. In the letter, EPA encouraged Boeing to consider the long term benefit of removing the caulk that was designated for stabilization.

**Draft Phase 3 IM Work Plan**  
**Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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#### **4.0 CAULK REMOVAL OR STABILIZATION**

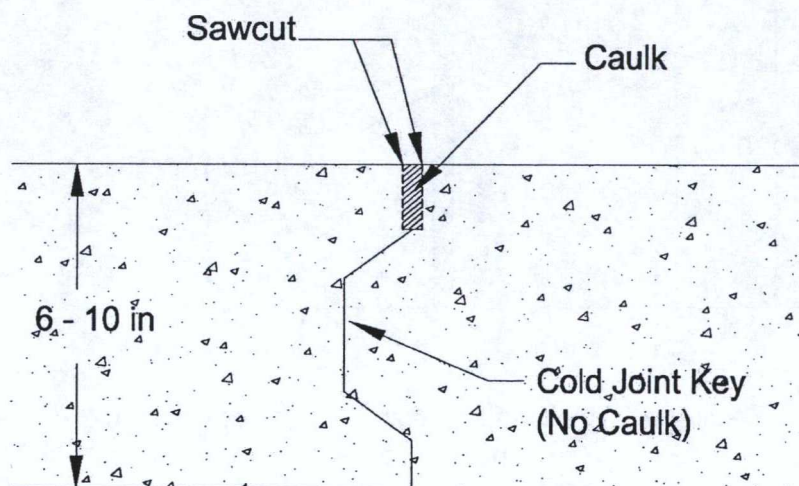
Boeing will remove all the caulk materials designated for removal ( $> 50$  ppm PCBs), and at a minimum, will stabilize all the caulk materials designated for stabilization ( $> 25$  ppm and  $\leq 50$  ppm PCBs) in accordance with the Phase 2 Report, Section 3.2 of this Phase 3 IM Work Plan, and attached Figures 6 and 7. Boeing may elect to remove those materials designated for stabilization if it is found that removal can be completed efficiently and cost effectively.

#### **4.1 Methodology**

##### **4.1.1 2-10 Area Caulk Removal**

Based on cores taken at representative seams, caulked joints in the 2-10 Area generally have a rectangular shape with a width of approximately  $3/8$  to  $1/2$  inch, and a depth of approximately 2 inches. The concrete slabs have thicknesses ranging from approximately 6 inches to 10 inches. The caulked portion of the joint forms a seal over an un-caulked, cold joint key between adjacent concrete panels as shown in Sketch 1 below. The caulk removal will be accomplished as follows:

- Sawcutting the seam between the caulk and the concrete on each side of the joint, to a depth of approximately 3 inches, i.e., enough to undercut the caulked portion
- Manually removing the caulk from the joint
- Manually cleaning, pressure washing, or mechanically reaming the sides and/or bottom of the caulked portion of the joint as needed to remove caulk remnants



Sketch 1: Section of Typical Joint in Concrete Pavement in 2-10 Area  
(not to scale)

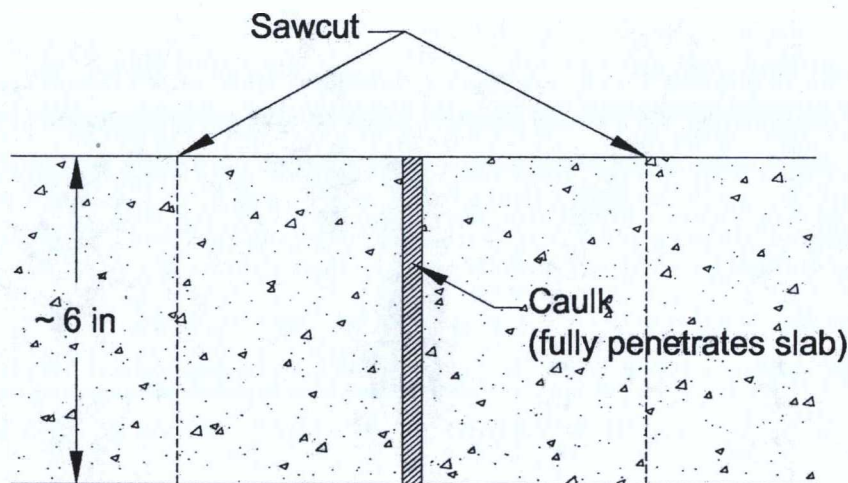
**Draft Phase 3 IM Work Plan**  
**Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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**4.1.2 2-60s Area Caulk Removal**

Based on cores taken at representative seams, caulked joints in the 2-60s Area generally range in width from 1/8 to 1/2 inch, and the joints fully penetrate the thickness of the concrete slabs, as shown in Sketch 2 below. Most slabs in the 2-60s Area are approximately 6 inches thick. The caulk removal in the 2-60s Area will be accomplished as follows:

- For caulk joints in the interior portions of the 2-60s slabs - Sawcutting through the concrete, on both sides of the joint (approximately 6 inches from the caulk joint), to the full depth of the caulk seam, typically the full thickness of the slab
- For caulk joints around the perimeter of slabs, where the joint is located between the floor slab and a perimeter stem wall or footing – Sawcutting through the floor slab approximately 12 inches from the caulk joint, through the full thickness of the slab
- Manually or mechanically removing the approximately 1-foot wide by 6-inch thick sawcut concrete and caulk
- Manually cleaning, pressure washing, or mechanically cleaning if needed to remove caulk remnants in cases of perimeter joints



Sketch 2: Section of Typical Interior Joint in Concrete Slab in 2-60s Area  
(not to scale)

## **Draft Phase 3 IM Work Plan**

### **Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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#### **4.1.3 2-10 and 2-60s Area Caulk Stabilization**

At a minimum, Boeing will stabilize the 2-10 Area and 2-60s Area caulk materials designated for such actions in accordance with the Phase 2 Report, Section 3.2 of this Phase 3 IM Work Plan, and attached Figures 6 and 7. Removal of these materials may be implemented by Boeing if it is found that the work can be performed efficiently and cost effectively using the saw cutting method described above. Stabilization will otherwise be accomplished as follows:

- Manual removal and/or high pressure jetting of caulk materials from designated joints to a depth of at least one inch.
- Application of a new layer of gray-colored caulk to cover and seal remaining dark colored caulk in the joints.
- Minimum thickness of the new sealant will be approximately 1/8 inch.
- The new gray caulk will be a polyurethane product, the gray color of which will contrast with the underlying stabilized caulk (stabilized caulk types 1A3 and 1C2 are black, and type 4A2 is dull gray to brownish black with a fibrous, wood-like appearance). The contrasting color of new caulk will readily enable visual identification of areas where stabilized caulk becomes exposed as a result of wear or erosion of the new caulk.

#### **4.1.4 Disposal**

Waste materials, including sawcutting slurry, jetting water, and removed caulk and concrete will be properly managed for characterization and disposal.

#### **4.2 Operation and Maintenance Plan**

Monitoring and maintenance of the stabilized caulk materials will be performed through periodic visual inspections and maintenance as follows:

- Visual inspection and maintenance (as needed) of the stabilized caulk every 6 months for the first year.
- Visual inspection and maintenance (as needed) of the stabilized caulk every 12 months after the first year.
- Replacement or supplementary application of additional sealant caulk at locations where the underlying stabilized caulk is exposed.
- Letter reports to EPA annually.

**Draft Phase 3 IM Work Plan**  
**Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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**5.0 SCHEDULE**

Phase 3 of the IM Work Plan includes removal or stabilization of caulk materials containing more than 25 ppm PCBs in the 2-10 and 2-60s Areas of Plant 2 in accordance with the approach proposed in the Phase 2 Report and Work Plan and this Phase 3 IM Work Plan. The schedule for Phase 3 is presented below. This work can only be performed during the dry season to enable the proper application of new caulk materials. As indicated in the schedule, some lead time and schedule flexibility will be required to contract for the work and materials and coordinate the work to minimize interference with ongoing Boeing operations.

Description	Due Date
Submit Phase 3 IM Work Plan	April 6, 2009
Receive EPA approval of Phase 3 IM Work Plan	To be determined
Issue RFPs to prospective contractors to begin competitive bidding/award process and 6-week materials requisition step. Coordinate to minimize disruption to operations.	Issue RFPs within 10 days of EPA approval.
Begin Removal & Stabilization Actions	By early August, 2009 (approximately 80 days after EPA approval), subject to timely EPA approval of work plan and following contractor selection, materials requisition and coordination with operations .
Complete Removal & Stabilization Actions, or curtail remaining activities until 2010 dry season if required	By the end of the 2009 dry season (~ end of September, 2009)
Submit IM Completion Report if all actions are completed during 2009 dry season. If all actions cannot be completed during 2009 dry season, submit a Preliminary Report for those actions completed.	30 days after completion of 2009 removal and stabilization activities. If all activities are not completed during 2009 dry season, then Completion Report to be submitted within 30 days of completing work in 2010 dry season.

**Draft Phase 3 IM Work Plan**  
**Removal and Stabilization of PCB-Containing Caulk in Concrete Pavements**

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**6.0 REFERENCES**

Boeing letter to EPA, Re: EPA letter dated February 15, 2007, February 26, 2007.

EPA letter to The Boeing Company, Re: Determination of the Requirement for an Interim Measure, EPA ID No WAD 00925 6819. February 15, 2007.

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Floyd|Snider. 2005. Memorandum: Summary of Recent Storm System Solids Survey and Source Control Sampling at Plant 2. November.

Golder Associates Inc., 2006. Stormwater Source Control Work Plan for Boeing Plant 2. October.

Golder Associates Inc., 2007a. Interim Measure Work Plan, Characterization of Caulk in Concrete Pavements at Boeing Plant 2. August.

Golder Associates Inc., 2007b. Stormwater Source Control Round 1 Sampling Report. 2006-2007. October.

Golder Associates Inc., 2007c. Revised Stormwater Source Control Work Plan for Boeing Plant 2. December.

Golder Associates Inc., 2008a. Phase 1 Report and Work Plan, Characterization of Caulk in Concrete Pavements at Boeing Plant 2. May.

Golder Associates Inc., 2008b. Interim Measure Completion Report, Removal of Stormwater Lines X & Y (OA 23.1 and OA 23.2) at Boeing Plant 2. May.

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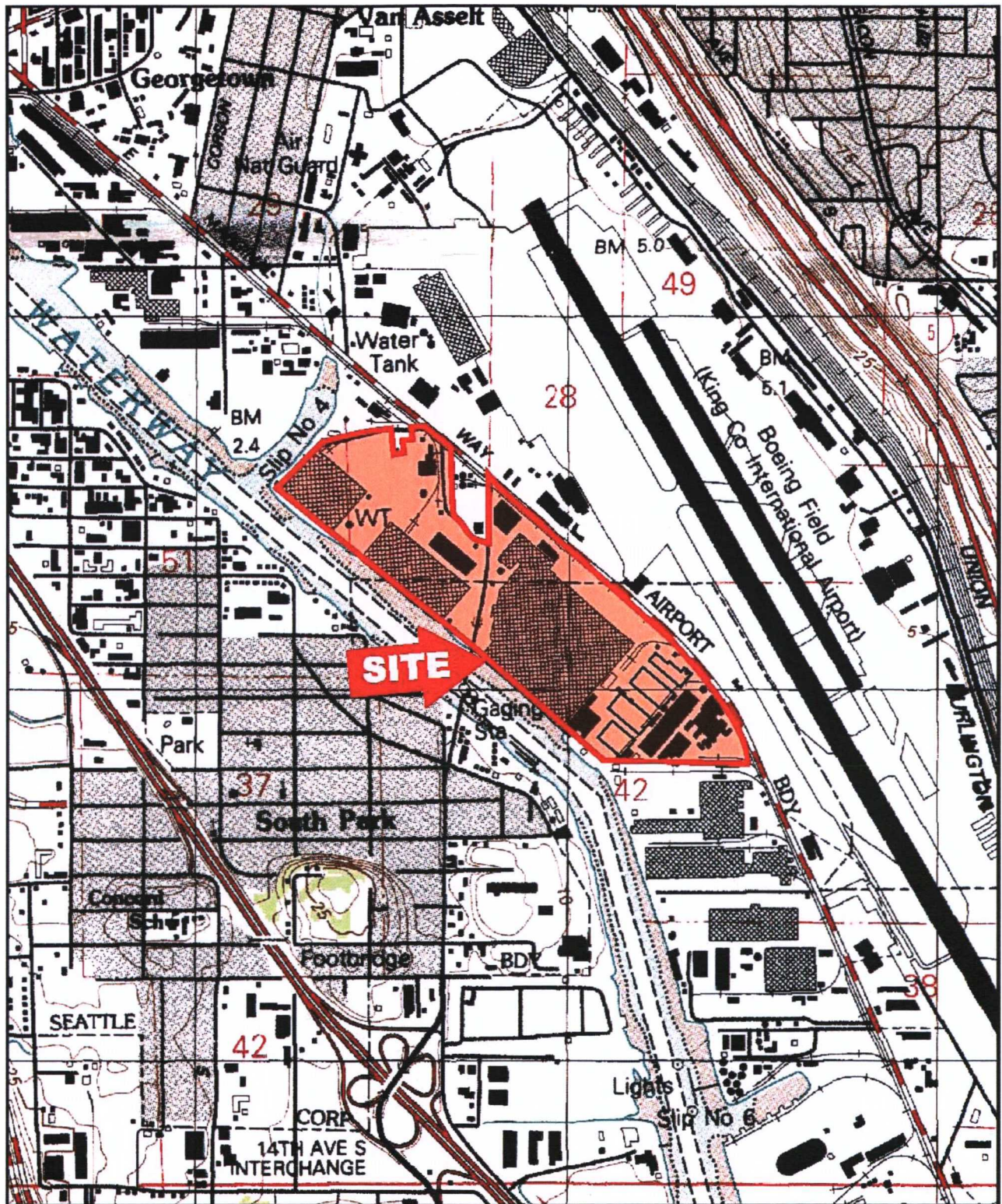
Golder Associates Inc., 2008d. Stormwater Source Control, Round 2 Sampling Report, 2007-2008, September.

Golder Associates Inc., 2008e. Draft Phase 2 Report and Work Plan, Characterization of Caulk in Concrete Pavements at Boeing Plant 2, October.

Golder Associates Inc., 2008f. Draft Interim Measure Completion Report, 2008 Stormwater Source Control Catch Basin Sampling and Storm Line Cleaning for Boeing Plant 2, December.



FIGURES



Phase 3 Caulk IM Work Plan  
Boeing Plant 2  
Seattle/Tukwila, Washington

Figure 1  
Vicinity Map

SHEET	DRAWN BY	REVIEWED BY	DATE
1 of 1	AMP	AMP	03/27/09

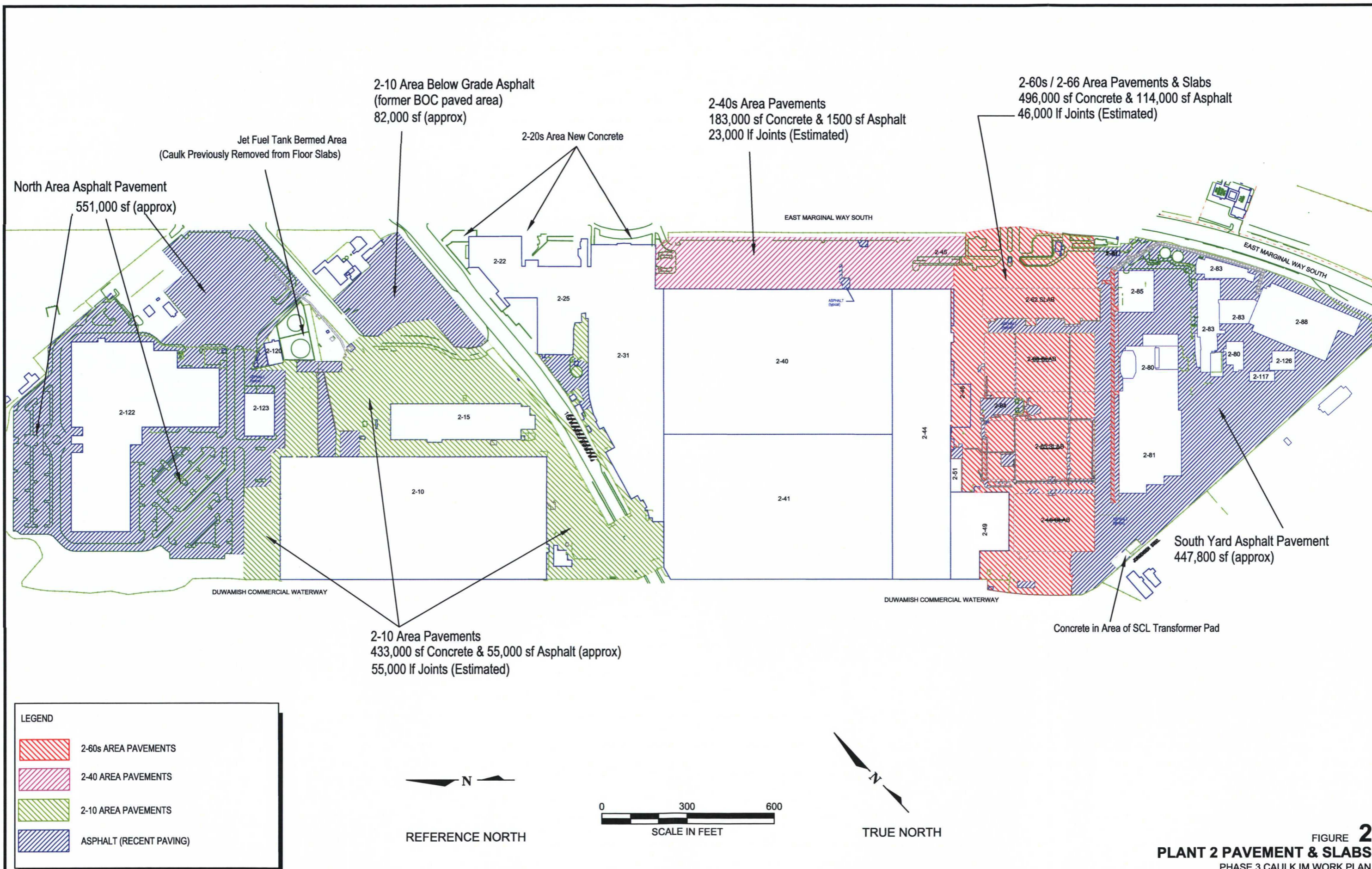
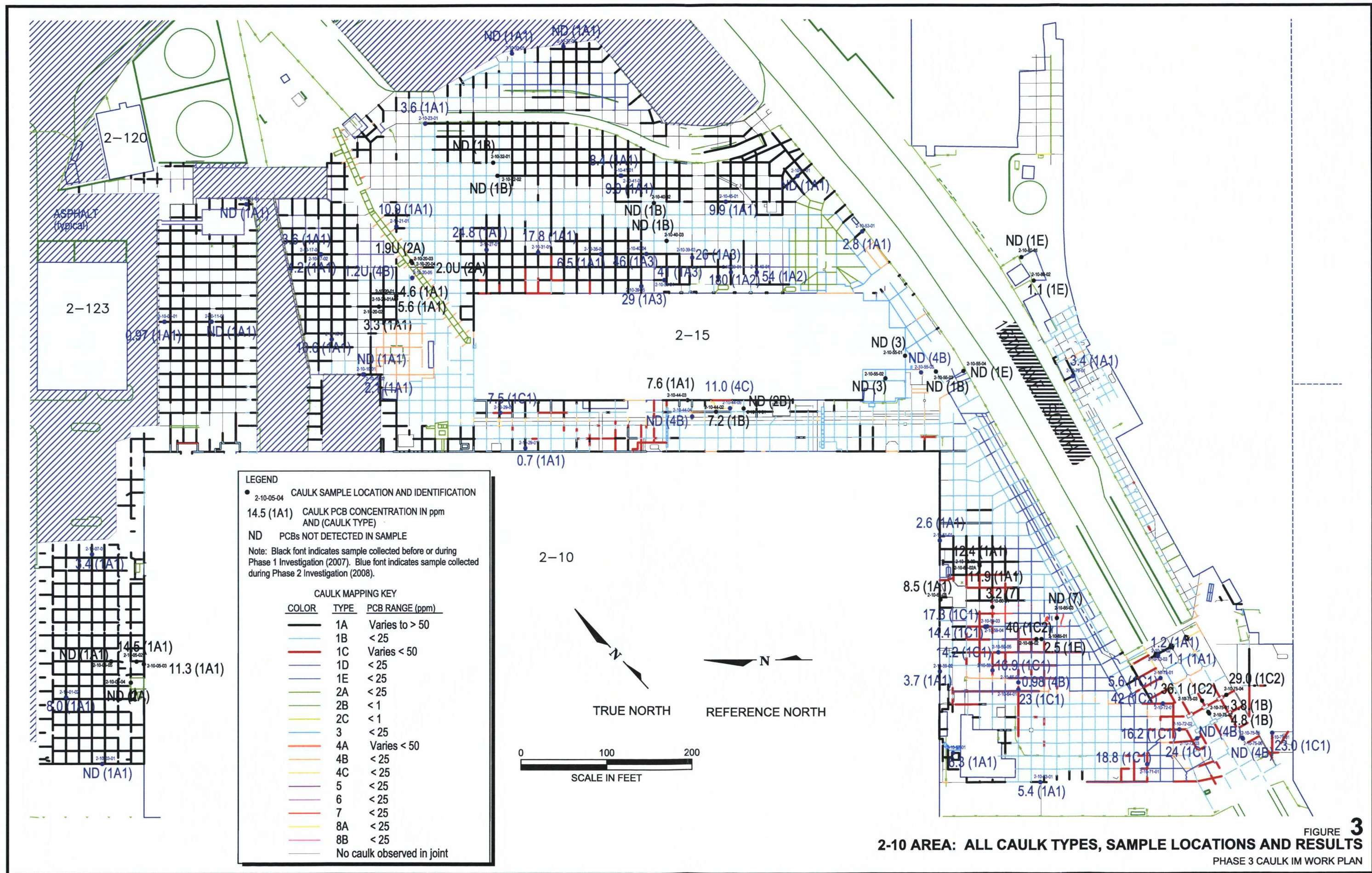


FIGURE 2  
**PLANT 2 PAVEMENT & SLABS**  
 PHASE 3 CAULK IM WORK PLAN



**LEGEND**

- 2-10-05-04 CAULK SAMPLE LOCATION AND IDENTIFICATION
- 14.5 (1A1) CAULK PCB CONCENTRATION IN ppm AND (CAULK TYPE)
- ND PCBs NOT DETECTED IN SAMPLE

Note: Black font indicates sample collected before or during Phase 1 Investigation (2007). Blue font indicates sample collected during Phase 2 Investigation (2008).

**CAULK MAPPING KEY**

COLOR	TYPE	PCB RANGE (ppm)
Black	1A	Varies to > 50
Light Blue	1B	< 25
Red	1C	Varies < 50
Dark Blue	1D	< 25
Blue	1E	< 25



REFERENCE NORTH

LEGEND



















- 2-10-05-04 CAULK SAMPLE LOCATION AND IDENTIFICATION

14.5 (1A1) CAULK PCB CONCENTRATION IN ppm  
AND (CAULK TYPE)

ND PCBs NOT DETECTED IN SAMPLE

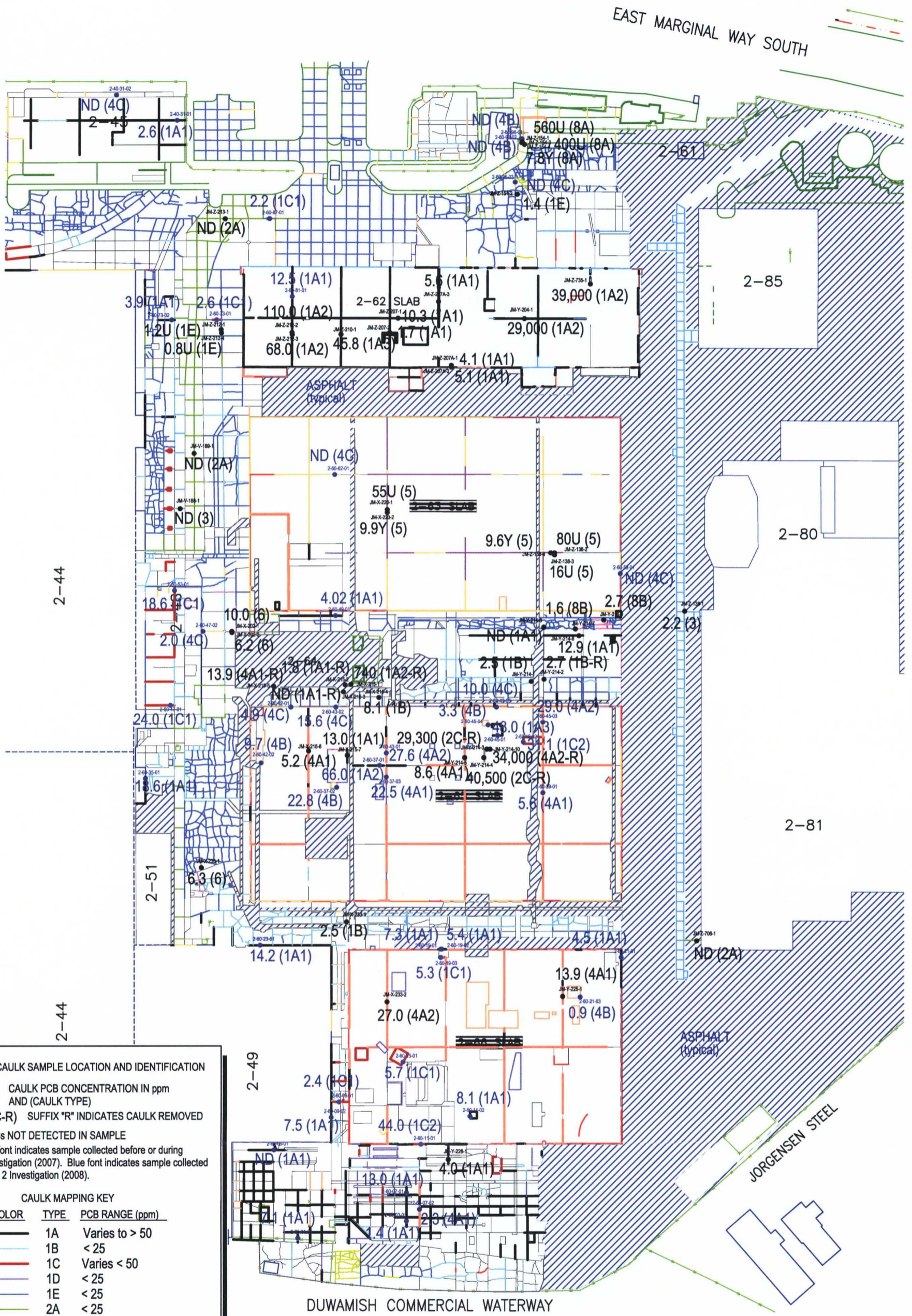
Note: Black font indicates sample collected before or during Phase 1 Investigation (2007). Blue font indicates sample collected during Phase 2 Investigation (2008).

CAULK MAPPING KEY

<u>COLOR</u>	<u>TYPE</u>	<u>PCB RANGE (ppm)</u>
	1A	Varies to > 50
	1B	< 25
	1C	Varies < 50
	1D	< 25
	1E	< 25
	2A	< 25
	2B	< 1
	2C	< 1
	3	< 25
	4A	Varies < 50
	4B	< 25
	4C	< 25
	5	< 25
	6	< 25
	7	< 25
	8A	< 25
	8B	< 25
	No caulk observed in joint	

**2-40s AREA: ALL CAULK TYPES, SAMPLE LOCATIONS AND RESULTS** FIGURE 4

PHASE 3 CAULK IM WORK PLAN



**FIGURE 5**  
**2-60s AREA: ALL CAULK TYPES, SAMPLE LOCATIONS AND RESULTS**  
 PHASE 3 CAULK IM WORK PLAN

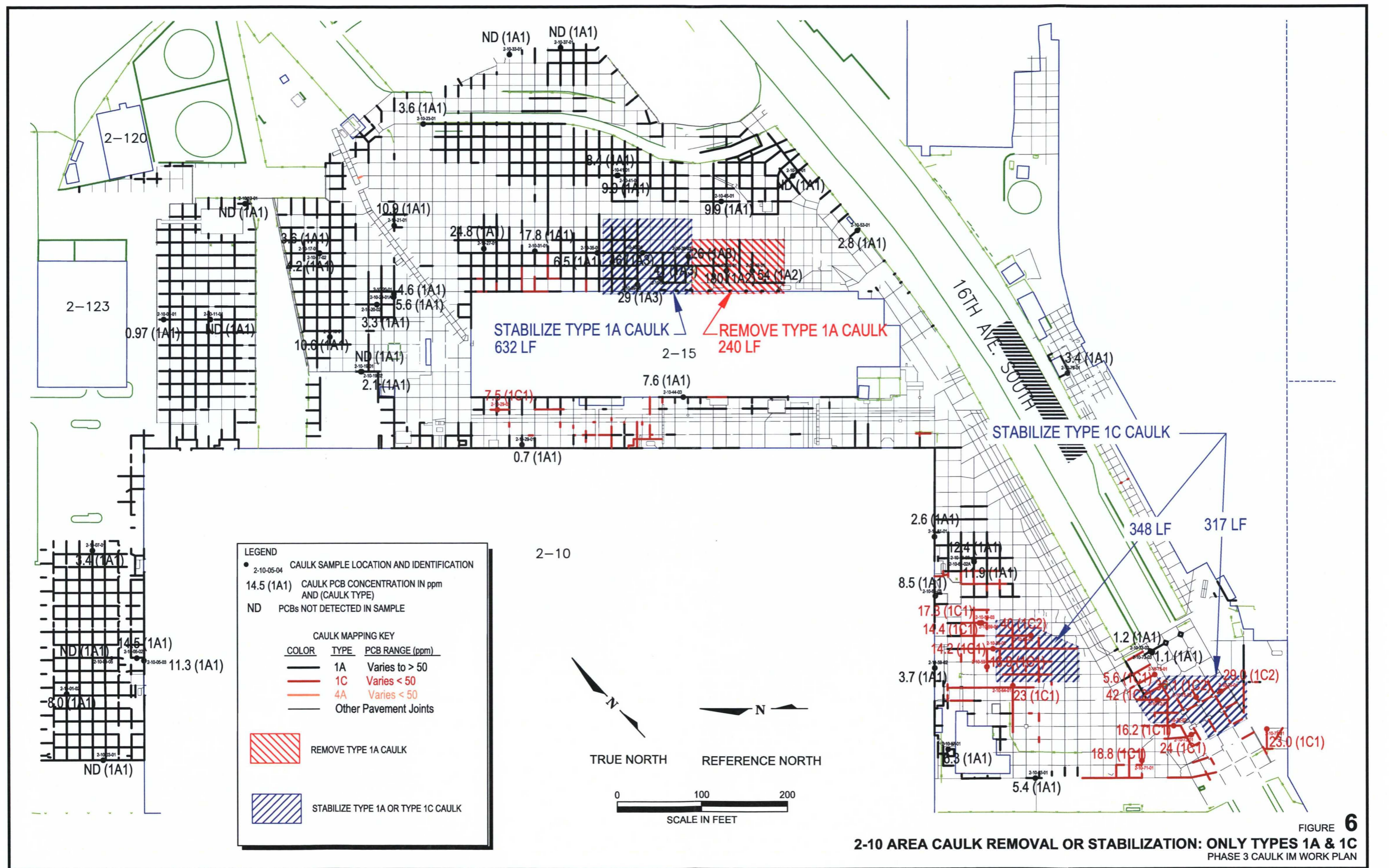


FIGURE 6



CD, 10A#75 →  
WA 68AF01d ✓ 15E-2